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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/972,011	10/05/2001	Steven Teig	SPLX.P0068	5250

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EXAMINER

ROSSOSHEK, YELENA

ART UNIT PAPER NUMBER

2825

DATE MAILED: 05/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/972,011

Applicant(s)

TEIG ET AL.

Examiner

Helen B Rossoshek

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 05 October 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 59-74 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 59-71 is/are rejected.
- 7) ☒ Claim(s) 72-74 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10/05/2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

**DETAILED ACTION**

***Claim Objections***

1. Claim 65, 69, 71 and 72-74 are objected to because of the following informalities:

Claim 65 line 6 delete "with".

Claim 69 line 6 delete "with".

Claim 72 line 6 delete "with".

Claims 71 and 74 have a dependency issue.

Claim 71 needs to be changed as:

- a) if claim 71 depends from claim 69 then on line 3 delete "said" insert -a--;
- b) if claim 71 depends from claim 70 then on line 2 delete "72" insert -73--.

Claim 74 needs to be changed as:

- a) if claim 74 depends from claim 72 then on line 3 delete "said" insert -a--;
- b) if claim 74 depends from claim 73 then on line 2 delete "72" insert -73--.

Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 59-64 are rejected under 35 U.S.C. 102(b) as being anticipated by Linsker et al. (US Patent 4,782,193).

As to claims 59-64 Linsker et al. teaches determining a preferred wiring angle for a metal layer of the integrated circuit layout by using principal wiring direction on a plane (col. 1, 14-23); determining a ratio of first interconnect line length along a first direction to a second interconnect line length along a second direction that is approximately 45 degrees from the first direction to create a simulated interconnect line along the preferred wiring angle in the light of calculating the ration between connection length along the principal wiring direction (L45) and minimum Manhattan length along orthogonal axes in a Cartesian coordinate system (MANH) (col. 9, II.59-67; col. 10, 1-3); routing the metal layer using the preferred wiring angle by creating interconnect wires made up of wire segments of the first interconnect line length along the first direction and wire segments of the second interconnect line length along the second direction (col. 11, II.55-59) as shown on the Fig. 5 e.g. set of planes S1 including plane 10(horizontal principal direction) and plane 30 (diagonal  $45^{\circ}$ ) or set of planes S4 including plane 10 (horizontal principal direction) and 40 (diagonal  $-45^{\circ}$ ) (col. 6, II.38-41); the first direction is horizontal and the second direction is substantially  $45^{\circ}$  from the horizontal as shown on the Fig. 5 and Fig. 1 wherein plane 10 has the principal horizontal direction (col. 5, II.50-54) and Fig. 3 and 4 wherein planes 30 or 40 which have principal direction  $45^{\circ}$  or  $135^{\circ}$  which is  $-45^{\circ}$ ; routing a first interconnect line along the preferred wiring angle by connecting alternating pairs of the first interconnect line

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length along the first direction and the second interconnect line length along the second direction as shown on the Fig. 5.

Moreover with respect to the claims 62-64 Linsker et al. teaches determining a preferred wiring angle for a metal layer by using principal wiring direction on a plane (col. 1, 14-23); determining a ratio of a first interconnect line length along a first direction to a second interconnect line length along a second direction that is substantially orthogonal to the first direction to create a simulated interconnect line along the preferred wiring angle by using set of planes wherein principal directions are orthogonal ( $90^\circ$ ) to each other (col. 2, II.6-11) within calculating the ratio as  $MANHI/MANH$  (col. 10, II.44-52); the first direction is horizontal and the second direction is vertical where wiring direction are along the Cartesian axes (col. 2, II.6-11; col. 12, II.54-57); routing a first interconnect line along the preferred wiring angle by connecting alternating pairs of an interconnect line length along the first direction and an a substantially interconnect line length along the second direction (col. 11, II.55-59; col. 13, II.1-4).

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 65-71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Teig et al. (US Patent Application 2002/0069397 in view of Linsker et al. (US Patent 4,782,193.

With respect to claims 65-71 Teig et al. teaches a plurality of circuit modules (par. [0009]; Fig. 1); a first interconnect line layer, the first interconnect line layer, the first interconnect line layer having a preferred horizontal direction of interconnect lines; a second interconnect line layer, the second interconnect line layer having a preferred vertical direction of interconnect lines (Manhattan layers) (par. [0086]; Fig. 8); and a third interconnect line layer, the third interconnect line layer having a first arbitrary (par. [0004]) diagonal preferred direction within octalinear layer 4 (par. [0087]) since wiring architecture can utilize different wiring layers in different order (par. [0087]-[0089]); a fourth interconnect line layer, the fourth interconnect line layer having a second diagonal preferred direction, the second diagonal preferred direction substantially orthogonal ( $90^\circ$ ) to the first diagonal preferred direction ( $180^\circ - 45^\circ = 135^\circ$  and  $135^\circ - 45^\circ = 90^\circ$ ) (par. [0087]) wherein interconnect lines on the fourth interconnect line layer comprise a plurality of alternating interconnect line subsegments since some jogs are allowed (par. [0004]); the first diagonal preferred direction is approximately  $45^\circ$  relative to the preferred horizontal direction and the second diagonal preferred direction is approximately  $-45^\circ$  relative to the preferred horizontal direction (par. [0087]); a fifth interconnect line layer, the fifth interconnect line layer having a second diagonal preferred direction, the second diagonal preferred direction substantially orthogonal to the first diagonal preferred direction ( $90^\circ$ ) to the first diagonal preferred direction ( $180^\circ -$

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$45^\circ = 135^\circ$  and  $135^\circ - 45^\circ = 90^\circ$ ) (par. [0087]) wherein interconnect lines on the fifth interconnect line layer comprise a plurality of alternating interconnect line subsegments since some jogs are allowed (par. [0004]); but lacks the alternating interconnect line subsegments in preferred direction. However Linsker et al. teaches interconnect lines on the third interconnect line layer comprise a plurality of alternating interconnect line subsegments wherein a first subsegment is horizontal and a second subsegment is approximately  $45^\circ$  diagonal to the horizontal as shown on the Fig. 3 and 4 (col. 6, ll. 16-25). It would have been obvious to one of ordinary skill on the art at the time the invention was made to have used Linsker et al. to teach the specifics subject matter Teig et al. does not teach, because this method is for the reduction, optimization or minimization in wiring length which is applicable in those technologies limiting each interconnection to lie within a single wiring plane set or pair, where the principal wiring directions of the set or pair do not comprise all principal wiring directions.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Helen B Rossoshek whose telephone number is 703-305-3827. The examiner can normally be reached on 7:30-4:30.

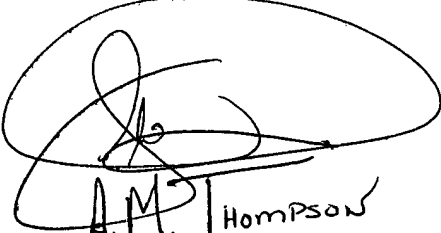
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S Smith can be reached on 703-308-1323. The fax phone numbers for the organization where this application or proceeding is assigned are 703-

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872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

HR      HR  
April 24, 2003



A.M. Thompson  
PATENT EXAMINER  
TECHNOLOGY CENTER 2800